REMARKS

Claims 1-8 are presently pending in the application.

Claim 3 has been amended to replace "sealing body" with "sealing plate," which is supported at least at page 11, line 23. Further, claims 1-3 have been amended to recite that the sealant is in direct contact with the metal case and the sealing body (claim 1) or with the gasket and the metal case or sealing plate (claim 3). These amendments are supported in the specification at least in Figs. 1-3 (described at page 12, lines 5-14; page 14, lines 11-13; and page 15, lines 20-23). Finally, claims 5-8 have been added, which describe properties of the organic pigments. These amendments are supported at least at page 16, line 16 to page 17, line 3; page 18, lines 8-12; and page 18, line 17 to page 19, line 1. No new matter has been added by these amendments.

At the outset, Applicants again note that an Information Disclosure Statement was filed with the application on February 6, 2002, but an initialed copy has still not been returned. Consideration of the references cited therein and return of an initialed PTO/SB/08A are respectfully requested.

The Examiner has again rejected claims 1 and 3 under 35 U.S.C. § 102(e) as being anticipated by, or in the alternative, under § 103(a) as being obvious over U.S. Patent No. 6,146,789 of Horie et al. ("Horie"). Claims 2 and 4 have also again been rejected under 35 U.S.C. § 103(a) as being unpatentable over Horie in view of U.S. Patent No. 4,772,291 of Shibanai et al. ("Shibanai"). Applicants respectfully traverse these rejections and the arguments in support thereof for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons which follow, and respectfully request reconsideration and withdrawal of the rejections.

Rejections Under § 102(e) or § 103(a) Based on Horie

The Examiner maintains, regarding claim 1, that Horie teaches an electrochemical cell having a positive electrode, a negative electrode, a separator, an electrolyte, and a metallic case. A sealing body allegedly seals the lower opening of the cell case, and a sealant [24] is between the metal case [21] and the sealing body [23], at least along the phantom line in Fig. 2 depicted by the Examiner in the Office Action. The Examiner contends that the polymeric sealant, which allegedly contains an organic pigment such as cyanine, has elastomeric properties because Horie

specifically teaches that it has applicability as a sealing gasket. Further, Fig. 3 of Horie allegedly shows a gasket or "sealing member made of a synthetic resin" between an outer metal case and a sealing body. The Examiner argues that the sealing body seals an opening of the metal case, such as its lower opening, since it extends laterally across the lower battery opening, and that an upper "opening portion" is likewise sealed by bending the outer can inwardly against the positive electrode terminal. As shown in Fig. 3, the sealant [34'] is allegedly between the gasket [33] and the sealing body [31]. In response to Applicants' previous argument, the Examiner contends that the present claims do not require direct contact between the metal case and the sealant or preclude other components from being intermediary between the metal case and the gasket.

Finally, as to the sealant having a color different from the color of the metal case and the sealing body, the Examiner argues that it is reasonably presumed that the sealant, having a specific absorption band in the visible light spectrum, would inherently have a distinct color from the metal case and the sealing body, absent a showing that the claimed invention distinguishes over the reference. Applicants respectfully traverse this rejection as follows.

The present invention is directed to an electrochemical element having a structure which is capable of simultaneously confirming the applied position and the uniformity of the thickness of sealant film applied to the case, sealing plate, and gasket of the electrochemical element by visual observation or image recognition without adversely affecting the characteristics of the sealant.

Previously, sealants were colorless, but Applicants have discovered that by utilizing a sealant composed mainly of an elastomer colored by an organic pigment with a color different from the metal case and the sealing body or plate (and preferably from the gasket), it is possible to evaluate and judge the applied state of a sealant film based on the difference in saturation or color tone between the sealant and respective components. This makes reduction of the variation of the applied sealant possible, as well as minimizing unevenness of the thickness of the sealant and reducing the amount of sealant which is applied to only that which is necessary and sufficient to ensure sealing of the element. Therefore, sealant can be applied in uniform thickness to a predetermined position, such as the peripheral portion of the sealing body or plate, and can prevent leakage of the electrolyte due to variation in the applied position and film thickness of the sealant.

As recited in claims 5-8, the sealant according to the invention is colored by an organic pigment which has chemical affinity for the elastomer which forms the main component, and has

a specific gravity which is substantially the same as that of the elastomer. Therefore, the pigment particles are evenly dispersed in the sealant, and no precipitation or separation of the pigment occurs (and thus no deterioration of the sealant). Since both the elastomer and the organic pigment have excellent heat resistance, and because adhesion between the sealant and other components are excellent, sealing performance can be maintained, even against excessive temperature changes and thermal stress. It is thus possible to obtain an electrochemical element with a reduced probability of electrolyte leakage.

According to the present invention, the sealant is in direct contact with the metal case and the sealing body (claim 1) or with the gasket and the metal case or the sealing plate (claim 3). In contrast, Horie teaches a battery in which a visible light or near-infrared light curing resin is used for providing a coating to insulate a gap between a positive and a negative electrode or between an end face and a peripheral edge portion of an opening portion of the battery case. As shown in Fig. 2 of Horie, for example, the coating 24, which the Examiner equates with the sealant, is not situated between and in direct contact with the metal case 21 and the gasket 23. Rather, the majority of the coating 24 is situated outside of the gasket, case, and negative electrode. Even along the phantom line drawn by the Examiner in Fig. 2 of Horie, coating 24 is not between and in direct contact with case 21 and gasket 23.

In one embodiment of the present invention, the electrochemical element contains a metal sealing plate to which the sealant is directly applied (claim 3 and page 11, line 23). The sealing plate can be made of stainless steel. In contrast, the Examiner notes that gasket 23, which the Examiner equates with the claimed sealing body or sealing plate, is made of a synthetic resin. There is no equivalent in Horie to the claimed (metal) sealing plate.

Finally, in the present invention, in order for the sealant to be provided in a pathway of an electrolyte creeping directly out of the metal case, it is situated between and in direct contact with the metal case and sealing body or between and in direct contact with a gasket and the metal case or sealing body. In contrast, in Fig. 2 of Horie, the pathway of the electrolyte creeping directly out of the metal case lies between the gasket 23 and an inner surface of a terminal 22 or an inner surface of a case 21. The insulating coat, between a negative electrode terminal and the gasket, is not in the pathway of the electrolyte creeping out of the case, but rather positioned at an outlet of the pathway. Therefore, the coating of Horie does not function as a sealant which prevents the electrolyte from leaking out as in the present invention.

For all of these reasons, Horie does not anticipate or render obvious the present claims, and reconsideration and withdrawal of the § 102(b) and § 103(a) rejections are respectfully requested.

Rejection Under § 103(a) Based on Horie in View of Shibanai

Regarding claims 2 and 4, the Examiner maintains that Horie teaches that the cyanine pigment is complexed with boron, but again acknowledges that Horie does not explicitly teach a phthalocyanine-based metal complex. However, the Examiner contends that Shibanai specifically demonstrates mutual equivalence between cyanine and phthalocyanine. Absent unexpected results between cyanine and phthalocyanine, the Examiner concludes that phthalocyanine would have been an obvious substitution to the artisan for reasons such as employing a suitable organic pigment based on its distinct absorption band for a particular application requiring the band in the visible light spectrum.

In response to Applicant's previous arguments, the Examiner argues that cyanine is a colored organic compound and that since phthalocyanine and cyanine are art-recognized equivalents, any advantages of the former would be deemed inherent and not unexpected. Applicants respectfully traverse this rejection as follows.

As previously explained, Horie does not teach or suggest all of the claimed elements, such as a sealant in direct contact with a metal case and sealing body or with a gasket and metal case or sealing plate, and even the proposed combination with Shibanai would not cure these deficiencies, since Shibanai is not directed to electrochemical elements. Rather, Shibanai teaches a method of using dyes for preparing densely colored pellets for synthetic resins by converting the dyes to the corresponding clathrate compounds. Dyes which may be used include, among 24 others, cyanine dye and phthalocyanine dye. However, since these dyes are used for a completely different application and not with an elastomer or organic electrolyte, Applicants maintain that one skilled in the art of Horie or the present invention would not look to Shibanai for alternative dyes to cyanines for use in a battery.

The Examiner again contends that cyanine and phthalocyanine are art-recognized equivalents, and that it would be obvious for the skilled artisan to substitute one for the other. However, these classes of cyanine and phthalocyanine-based metal complexes are clearly not equivalent with respect to the claimed sealants, since cyanine is an inferior dye with noticeable drawbacks, and phthalocyanine-based metal complexes are superior pigments with many

advantages. Specifically, organic pigments composed of a phthalocyanine-based metal complex exhibit excellent organic solvent resistance, alkali resistance, and acid resistance with respect to various types of electrolytes such as organic solvents, exhibit specific gravity similar to the elastomers used in the sealants, display superior heat resistance, and do not dissolve in organic electrolytes. In contrast, cyanine dyes have poor organic solvent resistance and heat resistance, and also dissolve in organic electrolytes. As shown in Table 2 at page 24 of the present application, Battery A which contains a phthalocyanine-based metal complex pigment, exhibits excellent electrolyte leakage resistance. Such properties would not be expected for a battery utilizing a cyanine dye given the different physical properties of cyanine dyes relative to phthalocyanine-based metal complex pigments, especially with respect to organic electrolytes.

Further, if one skilled in the art were to assume that phthalocyanine and cyanine are art-recognized equivalents, one would expect similar results to be obtained by using either class of dye or pigment. However, at least for the present application, these cyanine and phthalocyanine-based metal complex classes are clearly not equivalent due to their different properties, particularly with respect to the sealants utilized in the present invention. Accordingly, if one were to select cyanine, one of a long list of possible dyes of Horie (col. 4, lines 4-8), it would not be obvious to replace it with a phthalocyanine-based metal complex, as previously explained, and the presently observed properties would not be expected based on such a substitution.

Accordingly, for all of these reasons, the present invention would not have been obvious based on the proposed combination of Horie and Shibanai, and reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

In view of the preceding Amendments and Remarks, Applicants submit that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

TADAYOSHI TAKAHASHI *ET AL.*

December 16, 2004 By: Sandra M. Katz
(Date)

SANDRA M. KATZ
Registration No. 51,864
AKIN, GUMP, STRAUSS, HAUER & FELD, L.L.P.
One Commerce Square
2005 Market Street - Suite 2200
Philadelphia, PA 19103-7086
Telephone: (215) 965-1200
Direct Dial: (215) 965-1344
Facsimile: (215) 965-1210
E-Mail:skatz@akingump.com

WWS/SMK:smk
Encl: Request for Continued Examination (RCE)